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United States of America

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Proposal for Agenda Item 1.13.1

1.13: on the basis of results of the studies in accordance with Resolutions 130(WRC-97), 131(WRC-97), and 538(WRC-97):

1.13.1: *to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services;*

1.13.2: *to consider the inclusion in other frequency bands of similar limits in Articles S21 and S22, or other regulatory approaches to be applied in relation to sharing situations;*

Background Information: WRC-97 adopted provisional power flux density limits in certain frequency bands which would apply to non-GSO FSS systems to protect GSO FSS networks, and GSO BSS networks. Resolution 130 (WRC-97), *Use of Non-Geostationary Systems in the Fixed-Satellite Service in Certain Frequency Bands* and Article S22.2 of the Radio Regulations contain provisional limits corresponding to an interference level caused by one NGSO system in the frequency bands 10.7-12.75 GHz, 17.8-18.6 GHz, and 19.7-20.2 GHz. Resolution 538, *Use of the Frequency Bands Covered by Appendices 30 and 30A by Non-GSO Systems in the Fixed-Satellite Service*, and Article S22 contain limits corresponding to permissible levels of interference level from a NGSO system into a GSO BSS network. Resolution 131 (WRC-97), *Power Flux-Density Limits Applicable to Non-GSO FSS Systems for Protection of Terrestrial Services in the Bands 10.7-12.75 GHz and 17.7-19.3 GHz*, and Article S21 contain limits to protect terrestrial services. Resolution 131 requests review of the non-provisional limits and calls for further study of non-provisional pfd limits.

Proposals:

1: Proposals to require coordination between NGSO FSS transmitting space stations and GSO receive earth stations with antenna gains greater than a specified value. These proposals include additions and/or modifications to Articles S5, S9, and S22 and Appendices S4 and S5.

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MOD FOOTNOTES

MOD S5.441

The use of the bands 4 500-4 800 MHz (space-to-Earth), 6 725-7 025 MHz (Earth-to-space) by the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth), and 12.75-13.25 GHz (Earth-to-space) by non-geostationary-satellite systems in the fixed-satellite service ~~shall be in accordance with~~ is subject to the provisions of Resolution **130 (WRC-97)** Article **S22** and No. **S9.12**. The use of the bands 10.7-10.95 GHz (space-to-Earth) and 11.2-11.45 GHz (space-to-Earth) is subject to the provisions of No. **S9.16A** and **S9.16B**.

MOD S5.484A

The use of the bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 13.75-14.5 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), 29.5-30 GHz (Earth-to-space) by non-geostationary- and geostationary-satellite systems in the fixed-satellite service is subject to the provisions of ~~Resolution **130 (WRC-97)** Article **S22** and No. **S9.12**. The use of the bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 17.8-18.6 GHz (space-to-Earth), and 19.7-20.2 GHz (space-to-Earth) is subject to the provisions of No. **S9.16A** and **S9.16B**. The use of the band 17.8-18.1 GHz (space-to-Earth) by non-geostationary fixed-satellite service systems is also subject to the provisions of Resolution **538 (WRC-97)**.~~

Reasons: The references to Resolutions **130 (WRC-97)** and **538 (WRC-97)** were replaced by a reference to Article **S22** where the non-transitional provisions of these resolutions are contained. The Article **S9** provisions for stations for which the requirement to coordinate is included in a footnote to the Table of Frequency Allocations were specified in order to clarify the requirements for coordination under the existing No. **S9.12**. The proposed **S9.16A** and **S9.16B** would require coordination between NGSO FSS transmit satellites and GSO FSS receive earth stations with large antennas. GSO FSS earth stations with large antennas are not adequately protected by the EPFD levels contained in Table S22-3 and case-by-case coordination of systems operating co-frequency, co-directional links in the space-to-Earth direction is required.

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ADD TO ARTICLE S9

- ADD S9.16A** vi) which is a specific earth station within a geostationary-satellite network in the fixed-satellite service in certain frequency bands subject to **S5.441** or **S5.484A**, in respect of a non-geostationary satellite system in the fixed-satellite service;
- ADD S9.16B** vii) which is a non-geostationary-satellite system in the fixed-satellite service in certain frequency bands subject to **S5.441** or **S5.484A**, in respect of a specific earth station within a geostationary satellite network in the fixed-satellite service;

Reasons: GSO FSS earth stations with large antennas are not adequately protected by the EPFD levels contained in **Table S22-3** and case-by-case coordination is required. Since coordination between a NGSO FSS space station and large GSO FSS earth stations is a new type of coordination that does not currently exist in Article **S9**, it is necessary to add two new entry points in Article **S9**:

- One entry point to enable the NGSO space station administration to request coordination with administrations having specific large earth station antennas
- Another entry point to enable the reciprocal coordination to take place, i.e. the possibility for an administration planning to implement a specific large GSO earth station to request coordination with administrations having NGSO FSS transmit space stations.

ADD TO
ARTICLE S22TABLE S22-3^{ZZ}

PART A

TABLE S22-3^{ZZ}

PART B

^{ZZ} -For certain receive earth stations, this Table is not applicable and coordination is required under **S9.16A** and **S9.16B**.

Reasons: The EPFD levels contained in **Table S22-3** do not adequately protect earth stations in geostationary satellite networks in the fixed-satellite service with large antenna gains. Case-by-case coordination is required by the proposed modifications to footnotes **S5.441** and **S5.484A**.

Since there is no requirement to give the specific locations of earth stations today, there may need to be a resolution written to have typical earth stations, already in coordination or notified, that meet the above criteria to be brought in as specific earth stations. In this resolution, there will have to be some guidance on priorities. Additional

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guidance will need to be added to the *Instructions for Filling Out the Form of Notice ApS4/II and ApS4/III Relating to Space Radiocommunication Stations* distributed by CR/65.

MOD TO APPENDIX S4

ANNEX 2B (TO APPENDIX S4)

Table of characteristics to be submitted for space and radio astronomy services

A. General characteristics of the satellite network or the earth station

(Only these two columns are reproduced. These changes need to be incorporated into the full table.)

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Items in Appendix	Notification or co-ordination of a GSO network (including Appendix S30B)
A.1.a	X
A.1.b	
A.1.c	
A.1.d	
A.1.e.1	
A.1.e.2	
A.1.e.3	C ^{ZZ}
A.1.e.4	
A.1.f	X
A.2.a	X
A.2.b	X
A.2.c	
A.3	X
A.4.a.1	X
A.4.a.2	X
A.4.a.3	X
A.4.a.4	X
A.4.a.5	X
A.4.b	
A.4.c	
A.5	X
A.6	X
A.7.a	C ^{ZZ}
A.7.b	C ^{ZZ}
A.7.c	C ^{ZZ}
A.7.d	C ^{ZZ}
A.8	
A.9	
A.10	
A.11	
A.12	
A.13	X

X Mandatory information

O Optional information

C This information need only be furnished when it has been used as a basis to effect coordination with another administration

^{ZZ)} Required for coordination under No. **S9.16A** or **S9.16B**.

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B. Characteristics to be provided for each satellite antenna beam and for each earth station antenna

Items in Appendix	Notification or coordination of a GSO network (including Appendix S30B)
B.1	X
B.2	X
B.3.a	X
B.3.b.1	X
B.3.b.2	X
B.3.c	C
B.3.d	X
B.3.e	X
B.3.f	X
B.3.g.1	
B.3.g.2	
B.3.g.3	
B.3.g.4	
B.3.g.5	
B.3.g.6	
B.3.g.7	
B.4.a	
B.4.b	
B.5.a	C ^{ZZ}
B.5.b	C ^{ZZ}
B.5.c	C ^{ZZ}
B.6	

X Mandatory information

O Optional information

C This information need only be furnished when it has been used as a basis to effect coordination with another administration

^{ZZ}) Required for coordination under No. **S9.16A** or **S9.16B**.

Reasons: This is consequential to proposed modifications to footnotes **S5.441** and **S5.484A**. Administrations will need to submit specific earth station information for earth stations associated with geostationary-satellite networks in the fixed-satellite service with maximum antenna gains as specified in the proposed addition to Appendix **S5**.

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ADD TO APPENDIX S5

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. S9.16A <u>GSO earth station/NGSO system</u>	<u>A specific earth station in a geostationary satellite network in the fixed-satellite service in respect of a non-geostationary-satellite system in the fixed-satellite service.</u>	<u>The following frequency bands subject to S5.441 or S5.484A:</u> <u>10.7-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 17.8-18.6 GHz (space-to-Earth), and 19.7-20.2 GHz (space-to-Earth)</u>	<u>Conditions:</u> <u>i) the frequency bands overlap and</u> <u>ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations with an antenna gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz</u>	<u>i) compare frequency bands and</u> <u>ii) use the maximum antenna gain of the specific receive earth station in the geostationary-satellite network as given in Appendix S4 data</u>	<u>The thresholds/conditions for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit.</u>

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No. S9.16B <u>NGSO system/ GSO earth station/</u>	<u>A non-geostationary-satellite system in the fixed-satellite service in respect of a specific earth station in a geostationary satellite network in the fixed satellite service.</u>	The following frequency bands subject to S5.441 or S5.484A : 10.7-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 17.8-18.6 GHz (space-to-Earth), and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) <u>the frequency bands overlap and</u> ii) <u>the satellite network using the geostationary-satellite orbit has specific receive earth stations with an antenna gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz</u>	i) <u>compare frequency bands and</u> ii) <u>use the maximum antenna gain of the specific receive earth station in the geostationary-satellite network as given in Appendix S4 data</u>	<u>The threshold/condition for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit.</u>
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Reasons: This is consequential to proposed changes to footnotes **S5.441** and **S5.484A**. Earth stations with large antenna gains as defined in the condition/threshold column are not adequately protected by the EPFD levels contained in Table S22-3 and case-by-case coordination is required.

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2. Proposal to modify Articles S5 and S22 to clarify that there was no allocation to NGSO FSS (Earth-to-space) in the band 17.3-17.8 GHz in Region 2. Additionally, sharing studies done since WRC-97 indicate that the NGSO FSS is not compatible with the existing and allocated services.

MOD FOOTNOTE

IOD S5.516

The use of the bands 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article S11. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2 by non-geostationary-satellite systems in the fixed-satellite service is subject to the provisions of Resolution 538 (WRC-97). The use of the band 17.3-17.8 GHz in Region 2 by systems in the fixed-satellite service (Earth-to-space) is limited to geostationary-satellites.

Reasons: Additional text to clarify the intent of the footnote. There is no allocation in the band 17.3-17.8 GHz in Region 2 for NGSO FSS (Earth-to-space). The possibility of an allocation was to be based on sharing studies between the NGSO FSS and the existing and planned services. Studies show that sharing between radiolocation stations and NGSO FSS networks is not feasible due to severe interference from operational radiolocation stations and these services are not compatible. In Region 2, the band 17.3-17.8 GHz is allocated to the BSS service beginning 1 April 2007. Studies show that transmit NGSO FSS earth stations are not compatible with receive BSS earth stations.

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MOD TO
ARTICLE S22

TABLE S22-1

Frequency band allocated to the broadcasting-satellite service	Antenna diameter (cm)	Equivalent pfd level (dB(W/m ² /4kHz)) which may not be exceeded during the percentage of time shown		Reference antenna radiation pattern
		99.7%	100%	
11.7-12.5 GHz in Region 1, 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3	30 60 90	-172.3 -183.3 -186.8	-169.3 -170.3 -170.3	Recommendation ITU-R BO.1213
12.2-12.7 GHz in Region 2	45 100 120 180	-174.3 -186.3 -187.9 -191.4	-165.3 -170.3 -170.3 -170.3	§ 3.7.2 of Annex 5 of Appendix S30
17.3-17.8 GHz in Region 2	For further study ⁴⁾			
⁴⁾ —The interference from non-geostationary fixed-satellite service (non-GSO FSS) systems into geostationary broadcasting-satellite service (GSO BSS) systems operating in the frequency bands 17.3-17.8 GHz relates to the two following sharing situations: —non GSO FSS transmit earth station into GSO receive earth station; —GSO BSS transmit space station into non GSO FSS receive space stations. Both situations need to be studied, in particular since coexistence of receive BSS earth stations and large numbers of transmit non GSO FSS terminals would not be feasible within the same country				

Reasons: WRC-97 did not allow NGSO FSS (space-to-Earth) systems to operate in the band 17.3-17.8 GHz in Region 2. Equivalent pfd (EPFD) levels, as given in **Table S22-1**, are only applicable to NGSO space-to-Earth operations. In addition, there is no allocation in the band 17.3-17.8 GHz in Region 2 for NGSO FSS (Earth-to-space). The possibility of an allocation was to be based on sharing studies between the NGSO FSS and the existing and planned services. In Region 2, the band 17.3-17.8 GHz is allocated to the BSS service beginning 1 April 2007. Studies show that transmit NGSO FSS earth stations are not compatible with receive BSS earth stations. Thus, this modification to **Table S22-1** is also consequential to the proposed modification to footnote **S5.516**.

3. Proposal to NOC footnotes in Article S5 in the band 13.75-14.0 GHz to maintain the delicate sharing situation between the fixed-satellite, radiolocation, radionavigation, and space research/Earth exploration-satellite services.

NOC S5.502

In the band 13.75 - 14 GHz, the e.i.r.p. of any emission from an earth station in the fixed-satellite service shall be at least 68 dBW, and should not exceed 85 dBW, with a minimum antenna diameter of 4.5 metres. In addition the e.i.r.p., averaged over one second, radiated by a station in the radiolocation or radionavigation services towards the geostationary-satellite orbit shall not exceed 59 dBW.

NOC S5.503

In the band 13.75 - 14 GHz, geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 shall operate on an equal basis with stations in the fixed-satellite service; after that date, new geostationary space stations in the space research service will operate on a secondary basis. The e.i.r.p. density of emissions from any earth station in the fixed-satellite service shall not exceed 71 dBW in any 6 MHz band in the frequency range 13.772 - 13.778 GHz until those geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 cease to operate in this band. Automatic power control may be used to increase the e.i.r.p. density above 71 dBW in any 6 MHz band in this frequency range to compensate for rain attenuation, to the extent that the power-flux density at the fixed-satellite service space station does not exceed the value resulting from use of an e.i.r.p. of 71 dBW in any 6 MHz band in clear sky conditions.

Reasons: To maintain the delicate sharing situation between the fixed-satellite, radiolocation, radionavigation, and space research/Earth exploration-satellite services, the requirements contained in the above footnotes cannot change. The restrictions specified in these footnotes are necessary for the protection of GSO FSS carriers from radar interference and also minimize the possibility of unacceptable interference to the radiolocation and radionavigation services. Studies show that there is a significant potential for unacceptable interference to NGSO FSS satellite receivers from radiolocation stations in the 13.75-14.0 GHz band.